Institut for Matematik og Datalogi
Syddansk Universitet

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JBJ

DM517 – Fall 2014 – Weekly Note 4

Lecture in week 38, 2013:
We covered the last part of Section 2.1, Section 2.3 as well as pages 111-116 in the book. Key points:

- Every context-free language can be generated by a context-free grammar which is in Chomsky normal form. This is important in particular when we want to answer questions such as: given a CFG G and a string w; does G generate w?
- A pushdown automaton (PDA) is a nondeterministic finite automaton enhanced with a stack which makes PDAs more powerful than DFAs and NFAs.
- If we require that a PDA is deterministic, then we loose power in terms of which languages can be recognized. Note that this did not happen for Finite automata!
- There exist languages that are not context-free, and the pumping lemma can be used to prove that this is the case for a given language. As for regular languages, the proof goes by contradiction. A typical example of a non-context free language is $\{a^n b^n c^n | n \geq 0\}$.
- Every regular language is context free.
- The intersection of a context free language L with a regular language R is again a context-free language.

Lecture September 23, 2014:

- Equivalence between languages recognized by PDAs and context-free languages. Pages 117-125.
- A bit more on the pumping lemma for CFL.
- (Part of) Section 3.1 on Turing Machines.

Exercises September 24, 2014

- 2.14 and 2.16.
- 2.42 Hint for (d): first intersect the language with a suitably chosen regular language and then prove that the language you obtain is not context-free.

- 2.58.
- Problem 2, january 2002.
- Problem 4, January 2002.
- Problem 2 (a)-(c), January 2004
- Problem 3 (b)-(d), January 2004.
- Problem 2 October 2011